REMARKS/ARGUMENTS

In the Office Action Summary, the Examiner has noted that claims 1-31 are pending in this Application. Applicants submit that a Preliminary Amendment was filed on February 28, 2002, in which claims 31-32 were canceled and new claim 33 was added. Applicants respectfully request that the status of the pending claims be correctly identified in the next Office Action.

The Examiner has rejected Claims 1-10, 30 and 31 under 35 USC 103(a) as obvious in view of Ward et al. (United States Patent No. 4,736,390) (hereinafter Ward) in combination with Tilley et al. (United States Patent No. 6,225,848) (hereinafter Tilley). Claim 1 is amended above to clarify its language and. Claim 1, for example, has been amended to recite the "emulation" of the direct-conversion system, using a complementary pair of mixing signals instead of one. Claim 1 is also amended to recite, in part, "time-domain" analysis as described in the specification, and shown for example, in Figures 4(a) and 4(b). Other claims are also amended to clarify their respective languages. Claims 25-26 are canceled. In view of the foregoing amendments and following remarks, reconsideration of the rejections of the pending claims is respectfully requested. Applicants submit that the claims presently on file distinguish over these references, but note that the claims have been amended to clarify their respective languages and to expedite the issuance of the patent.

Ward et al. describe a down-conversion topology which combines pseudo-random encoding with a standard zero-IF topology. Ward et al. explain at lines 8 – 12 of column 1: "Zero IF type receivers are well known in the prior art and essentially a zero IF type receiver skips the step of going to an IF frequency and instead converts the desired incoming signal directly to baseband in a single operation." In other words, a zero-IF topology uses a single mixer, and down-converts the incoming signal to baseband (for example) with a single mixing signal at the carrier frequency of the received signal.

Ward et al. modify this system by spreading the single mixing signal with a pseudo-random signal, and then at a second mixer, de-spreading the output from the first mixer using the same

pseudo-random signal. But a single mixing signal is being used to perform the down-conversion. The pseudo-random signal is being used for a different purpose – spreading and de-spreading rather than down-conversion.

Claim 1 distinguishes from the system of Ward et al. for at least the following reasons. Ward et al. fail to describe a complementary pair of mixing signals which "emulate" a direct-conversion mixing signal, but rather, they still use a direct-conversion topology and a single mixing signal, and have laid known spreading and de-spreading over it. As best understood, because in Ward et al. the spreading and de-spreading are done with identical signals, any leakage from the local oscillator to the input of the first mixer would simply be spread and then de-spread again by the second mixer. Hence, the Ward system fails to reduce the effect of LO leakage at the input to the first mixer.

Furthermore, it appears that the Ward system would reduce the effect of LO leakage at the input to the second mixer, because any leakage at this point would be spread at the output of the second mixer. However, the second mixer only exists because the Ward system has added the second mixer to the zero-IF topology. Consequently, the Ward system does nothing to reduce LO leakage at the first mixer, and adds a second mixer that apparently does not have a major LO leakage problem. The second mixer adds to the size of the circuit, consumes power, and adds noise to the input signal. Therefore, it is not clear how the addition of this second mixer and the pseudo noise signals in Ward would do anything to improve overall performance.

Moreover, the mixing signals provided by the Ward system do not emulate a direct-conversion local oscillator signal "in a time domain analysis", as recited, in part, in claim 1. As noted in the Abstract, Figures 4a and 4b, and the corresponding description of the original disclosure, the mixing signals $\varphi 1$ and $\varphi 2$ of the invention are designed to emulate a direct-conversion local oscillator signal, in a time domain analysis, at any given point in time. The mixing signals $\varphi 1$ and $\varphi 2$ can take on any irregular pattern, provided that a time domain analysis shows them to emulate a direct conversion signal - one simply has to consider any vertical line in the time vs. amplitude diagram of Figures 4a or 4b to see that the two mixing signals emulate a regular

square wave direct conversion local oscillator signal. There is no disclosure in Ward of any mixing signal "designed to emulate said local oscillator signal having frequency *f*, in a time domain analysis".

Applicants submit that Tilley also fails to teach or suggest the inventions claimed above. As pointed out by the Examiner, Tilley describes a direct-conversion or zero-IF receiver in which a feedback loop is used to control DC offsets. Only a single mixing signal is used, and its frequency does not vary over time. Tilley thus fails to teach or suggest the two-mixer direct-conversion emulation of the present invention. Tilley thus teaches away from the invention in that it proposes a completely different approach to addressing LO leakage and DC offsets. Therefore, Ward, whether taken alone, or in combination with Tilley fails to teach or suggest claim 1. Claim 1 is thus allowable over Ward in view of Tilley for at least the reasons provided above. Claims 2-24, 27-30 and 33 are allowable for at least the same reasons as claim 1.

Claims 2-24, 27-30 and 33 are further allowable for reciting additional limitations that neither Ward, nor Tilley, whether taken singly or in combination, teach or suggest. For example, the Examiner has alleged that the limitations of claims 2 – 4 appear in Figures 2, 3A – 3E, and in the description between line 32 of column 5 and line 10 of column 6 of Ward. Applicants respectfully traverse. For example, Claim 2 recites "signals used to generate φ_1 and φ_2 do not have a significant amount of power at the frequency designed to be output from said successive mixers $x(t)$ φ_1 φ_2", which Ward fails to teach or suggest in Figures 2, 3A – 3E, and in the description between line 32 of column 5 and line 10 of column 6. The narrow band channel filter (38) referred to by the Examiner does not change the mixing signals – it merely changes the converted signal being passed from the first mixer to the second. None of the other filters in the Ward patent appear to affect the mixing signals either.

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (650) 752-2424.

Respectfully submitted,

Ardeshir Tabibi
Reg. No. 48,750

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, Eighth Floor
San Francisco, California 94111-3834
Tel: (650) 326-2400
Fax: (650) 326-2422
AT:deh

60313396 v1